

CLAIMS:

1. A mass polymerized rubber-modified polymeric composition comprising :  
a continuous matrix phase comprising a polymer of a monovinylidene aromatic  
monomer, and optionally, an ethylenically unsaturated nitrile monomer, and  
5 discrete rubber particles dispersed in said matrix, said rubber particles produced  
from a rubber component comprising from 5 to 100 weight percent of a  
functionalized diene rubber having at least one functional group per rubber molecule  
capable of enabling controlled radical polymerization;

wherein the composition is further characterized by:

- 10 a) a volume average rubber particle size of from about 0.15 to 0.35 micron,  
b) a total rubber phase volume between 12 and 45 percent , based on the total  
volume of the combination of the matrix phase and the rubber particles;  
c) a partial rubber phase volume between 2 and 20 percent characterized by rubber  
particles having a volume average particle size of greater than 0.40 microns; and  
15 d) a crosslinked rubber fraction of at least 85 percent by weight, based on the total  
weight of the rubber particles.

2. The composition of Claim 1 wherein the matrix phase comprises a copolymer of  
styrene and acrylonitrile.

3. The composition of Claim 1 wherein the matrix phase comprises a styrene  
20 homopolymer.

4. The composition of Claim 1 wherein the matrix phase polymer further comprises  
butylacrylate, N-phenyl maleimide or combinations thereof.

5. The composition of Claim 1 wherein the rubber component comprises a  
functionalized styrene/butadiene block copolymer.

25 6. The composition of Claim 5 wherein the styrene/butadiene rubber comprises at  
least 5 wt. percent styrene polymer block, based on the total weight of the block copolymer.

7. The composition of Claim 6 wherein the styrene/butadiene rubber comprises at  
least 10 wt. percent styrene polymer block, based on the total weight of the block  
copolymer.

30 8. The composition of Claim 5 wherein the block copolymer is functionalized with.  
2,2,6,6,-tetramethyl-1-piperidinyloxy (TEMPO); 2,2,6,6-tetramethyl-1-[1-[4-

(oxiranylmethoxy)phenyl]ethoxy]-piperidine; or 3,3,8,8,10,10-hexamethyl-9-[1-[4-(oxiranylmethoxy)phenyl]ethoxy]-1,5-dioxo-9-azaspiro[5.5]undecane.

9. The composition of Claim 1 wherein the functionalized rubber contains a functional group capable of atom transfer radical polymerization.

5 10. The composition of Claim 1 wherein the functional group is capable of reversible addition-fragmentation chain transfer polymerization.

11. The composition of Claim 1 wherein the discrete rubber particles have a monomodal particle size distribution of 1.25 or more.

10 12. The composition of Claim 1 wherein the discrete rubber particles have a bimodal particle size distribution, comprising larger rubber particles and smaller rubber particles.

13. The composition of Claim 12 wherein the smaller rubber particles are produced from a functionalized rubber and the larger rubber particles are produced from a non-functionalized rubber.

15 14. An article produced from the composition of Claim 1.